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ABSTRACT

The Cognitive Project at Passaic County College (New Jersey) was designed to develop a curriculum that would give educationally underprepared, nontraditional students an opportunity to actively experience ways of acquiring, solidifying, and using knowledge while acquiring the basic skills necessary for college work. Student explorations were designed to develop the following 12 competencies: inferential reasoning, changing frames of reference, generating possibilities, hypothetical reasoning, problem solving, decision making, understanding and making coherent arguments, metaphoric reasoning, classifying, seriating, understanding complex relationships, and reflection upon internal processes. They included student-centered activities that allowed students to make the connections between the basic skills and the cognitive processes that underlie them. For example, activities related to the nature of verbs, the nature of the sentence, and subject/verb agreement allowed students to (1) generate and test hypotheses regarding standard English usage, (2) experience "disequilibrium" when their old notions did not match reality, (3) classify grammatical categories according to student-determined criteria, and (4) analyze processes rather than memorizing grammatical products. A comparison of students taught by the project method and students taught according to syllabus objectives showed that more project students later enrolled into college level programs. (HOD)

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INTEGRATING COGNITIVE DEVELOPMENT AND THE BASIC SKILLS

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INTEGRATING COGNITIVE DEVELOPMENT AND THE BASIC SKILLS

There is growing concensus among developmental researchers that a substantial number, perhaps even a majority, of the freshmen admitted into colleges and universities in the United States are performing on the concrete operational level in terms of cognitive functioning.[1] Kuhn, et. al., report that at least sixty percent of the college age population is unable to operate at the formal level, the highest level of cognitive development.[2] In another study using Piagetian tasks, Schwebel found similar results, reporting a mean score below the level of formal operational thinking for a group of randomly selected university freshmen.[3]

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[1] According to Piaget, human intelligence follows roughly four stages of development: 1) Sensorimotor (0-1½ years) -- emphasis on coordination of actions; 2) Preoperational (2-6 years) -- use of symbols in play, language, and mental imagery; 3) Concrete-operational (6-11 years) -- reversible mental operations and thought connected to the concrete; 4) Formal-operations (11 or 12 - adolescence) -- ability to deal with the potential rather than only the concrete and understanding of relations between relations. While a particular individual may not necessarily pass through all four stages, the order of progression is invariable because of the very organization of each stage, i.e., one could not skip a stage nor could one proceed through the stages in a different order.

[2] D. Kuhn, J. Langer, L. Kohlberg, and N. Haan, "The Development of Formal Operations in Logical and Moral Judgement" (unpublished research paper sponsored by Columbia University International Scientific Research Pool Grant, 1974).

[3] M. Schwebel, "Formal Operations in First Year College Students," Journal of Developmental Psychology, Vol. 91 (1975) 133-141.

It is also generally assumed that nothing less than formal-operational intelligence is required to perform effectively at college-level work.[1]

The undereducated, urban community college student is much farther behind the average college or university freshman and is typically unable to deal with the intellectually complex operations called for in college courses. These students often manage to pass remedial courses through memorization and drilling, strategies which are quickly found inappropriate for college work. Our experience has shown and our findings are tending to confirm that the reason our students do not succeed in college level work despite their acquisition of the basic skills is that instruction at the remedial level has been directed at the surface of what our students need to know to succeed and, by and large, ignores the cognitive structures that would allow them to process, assimilate, and manipulate knowledge at the college level. Once they reach college programs, the facade quickly crumbles because the basic skills are unsupported by underlying cognitive structures. We believe that to continue to provide our students with only the surface competencies in reading and writing when so much more will be required of them is both ineffective and misguided.

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[1] This assumption is, of course, debatable. Our initial research into the cognitive demands of four introductory-level college courses at Passaic County College (Psychology I, Management, Accounting I, Physiology) indicated that while much of the classroom, assignment, and test demands of these courses could be handled by the dedicated concrete thinker with the skill and the will to memorize definitions, systems, classification, etc., much of the vital core of these courses call for intellectual manipulations that are clearly formal in nature. Our findings lead us to conclude that the concrete-operational student would have difficulty, to say the least, in weaving his or her way toward a degree at Passaic County College by avoiding formal task demands or through heroic compensations such as rote memorization of almost all course content.

The Cognitive Project

We are now in the third year of developing a remedial curriculum that allows students to acquire the basic skills while exploring and developing the underlying intellectual structures necessary for college level success. The growth of the project has been facilitated through a substantial, federally funded grant and support from the college administration. Passaic County College is an inner city community college with a large percentage of educationally disadvantaged students. The Cognitive Project now involves 12 fulltime instructors who teach remedial courses and approximately 350 students per semester. The project was designed to develop a curriculum that would give educationally underprepared, nontraditional students an opportunity to actively experience ways of acquiring, solidifying, and using knowledge while acquiring the basic skills necessary for college work. In essence, cognitive skills are used to allow students to explore basic skills and basic skills are used to allow students to explore cognitive skills.

Sources

Several sources were explored as psychological and practical models for the project. Piaget, Inhelder, and the cognitive constructivist movement in general, as well as the more recent research in cognitive psychology, provided the major theoretical foundations. The principles incorporated into the project design include:

1. Cognitive development is the predecessor of all learning. College students cannot assimilate that which is to be learned and cannot accomodate new modes and levels of intellectual activity unless appropriate cognitive structures are already developed. Rote memorization is an unacceptable alternative.
2. These structures develop through adaptive interaction with learning situations which are challenging enough to create a state of cognitive disequilibrium, but are not so challenging or distant as to be beyond the student's developmental level of functioning, i.e., there must be an "optimal mismatch" between where students are functioning intellectually and the activities in which they are engaging.
3. The content and operations of our working intellects are organized according to the nature of our knowledge system, i.e., there exist cognitive structures that underlie thinking across varying and seemingly disparate domains.

Re-inventing The Wheel

From a practical point of view, we had several programs on which to model our efforts. The ADAPT program (University of Nebraska), the DOORS program (Illinois Central), and the SOAR program (Xavier University) use specifically developed materials, activities, and approaches that prepare students intellectually for college work. These programs, however, deal essentially with students already accepted at the college freshmen level and deal with, for the most part, approaches geared toward success in the sciences. Our non-traditional students have college degree aspirations but fall well below college entry level standards. Therefore, the major task of the project has been to find, develop, and refine materials, activities, and approach appropriate for our non-traditional student population that emphasize the development of nascent intellectual abilities and the solidifying and application across many contexts of already developed ones. The "cognitive strands" that the project decided upon became, not means toward ends in the service of basic skill or content area mastery, but the very core of the curriculum. We didn't want to re-invent the wheel. We found ourselves in an area that didn't have one.

COGNITIVE STRANDS

While most remedial programs and texts deal with cognitive structures inadvertently, we have identified them as the major

objectives of the remedial effort. Guided by weekly faculty meetings, our individual research and consultations with Dr. Miriam Goldberg of Teachers College, Columbia University, and our analysis of the cognitive aspects of actual college courses over the last two years of the project, we have defined, redefined, and finally identified twelve cognitive processes that underlie basic reading and writing skills and college level courses. The project's student explorations are designed to explore and develop the following twelve cognitive competencies: inferential reasoning, changing frames of reference, generating possibilities, hypothetical reasoning, problem solving, decision making, understanding and making coherent arguments, metaphoric reasoning, classifying, seriating, understanding complex relationships, and reflection upon internal processes.

Essentially, the twelve "cognitive strands" mentioned above are woven throughout the program in such a way that they reinforce and strengthen each other while providing a process-oriented structure for the basic skills. This approach is in obvious contrast to "Thinking Skills" programs and texts which might deal with "classification" as a subject that is covered as a discrete topic or chapter and then moves on to "inference" which again is dealt with as a discrete topic, and so on. We do not claim that the twelve strands are an exhaustive taxonomy of thinking skills but merely that they were agreed upon as being a sensible list of cognitive competencies in terms of writing, reading, and academic functioning, and that they are more useful for remedial educators

than, for example, Guilford's 120 element "structure of intellect"[1] or reducing the complexities of the human mind into a rather simplistic hierarchy as in Bloom's taxonomy.[2]

Student Explorations

We developed the strands to make the cognitive demands of basic skill and college work more accessible to remedial educators and to provide a structure for the development of "Explorations" for our project. "Explorations" are student centered activities that allow students to make the connections between the basic skills and the cognitive processes that underlie them, which allow these skills and processes to feed off of and enrich each other, and which provide what students about to engage in college level work need most, new ways of looking at and operating in the academic world. The following is a brief description of such a student exploration. It focuses upon the specific grammatical concern of subject-verb agreement in the present tense. This is a particularly difficult concept for remedial students to master for many reasons, some of which are cultural and some purely cognitive in nature. The cognitive competencies are more than equally focal to this exploration and include class intension (defining) and class extension (recognizing class membership), determining causal relationships, determining analogous structures, re-constructing and applying conventional rules, generating hypotheses and testing them against reality and reflecting upon internal processes.

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[1] Guilford, J.P., The Nature of Human Intelligence, New York: McGraw Hill, 1967.

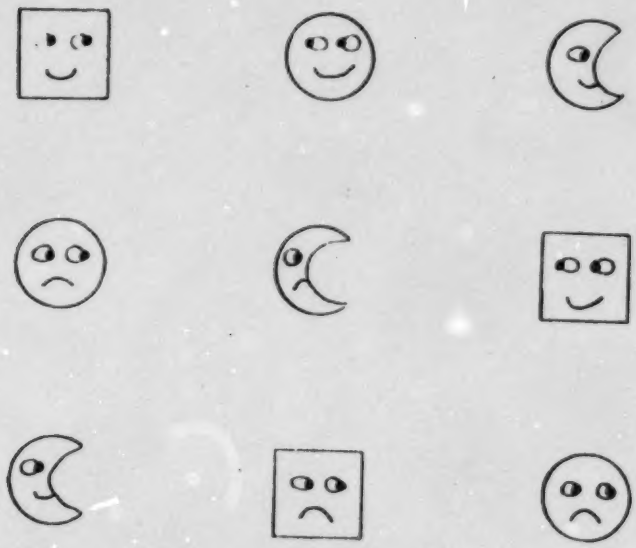
[2] Bloom, G. Taxonomy of Educational Objectives: Cognitive Domain New York: David McKay Co., 1956.

Our approach is not easily sampled from the whole program because explorations are not isolated "chapters" or events. The twelve cognitive strands of the project intertwine to enrich each other as well as the basic skills that they give structure to. Few programs attempt to use cognitive processes to develop basic skills. None that we know of propose, as we do, to use the basic skills to develop cognitive skills. The objective of this sample exploration is, therefore, not merely to teach subject verb agreement, although this is the content of the exploration, but to do so in such a way as to expose and explore universal intellectual competencies that structure knowledge and purposeful action. To succeed in college, students will need to internalize processes as well as content.

The Human Being is a Natural Rule Maker

This exploration grew out of our initial work in hypothesis generating and testing. We liberally adapted an experimental paradigm from the cognitive psychology literature for student exploration (particularly: Levine, M., Contemporary Issues in Cognitive Psychology, R.L. Solso (Ed.), Potomac, Md., Erbaum, '75; and Levine, M., in the Journal of Educational Psychology, '66, Volume 71, pp. 331-338). One of the activities that we invented to make this area of mental life more accessible to our students was what we call the "Introvert-Extrovert Exploration" which is shown in condensed form on the following page.

The characters below follow certain rules for smiling and frowning: all □ 's follow their own rule; all ○ 's follow their own rule; and all ☾ 's follow their own rule. Do what you have to do to find these rules and record your method or methods of solutions as you proceed.



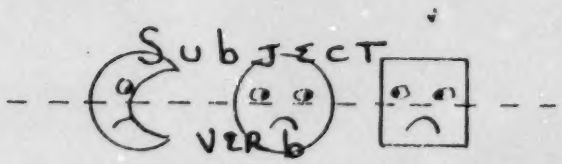
The "laws" that students extracted from these examples were:

☾ = Introverts: Enjoy lack of eye contact (smile) and dislike eye contact (frown)

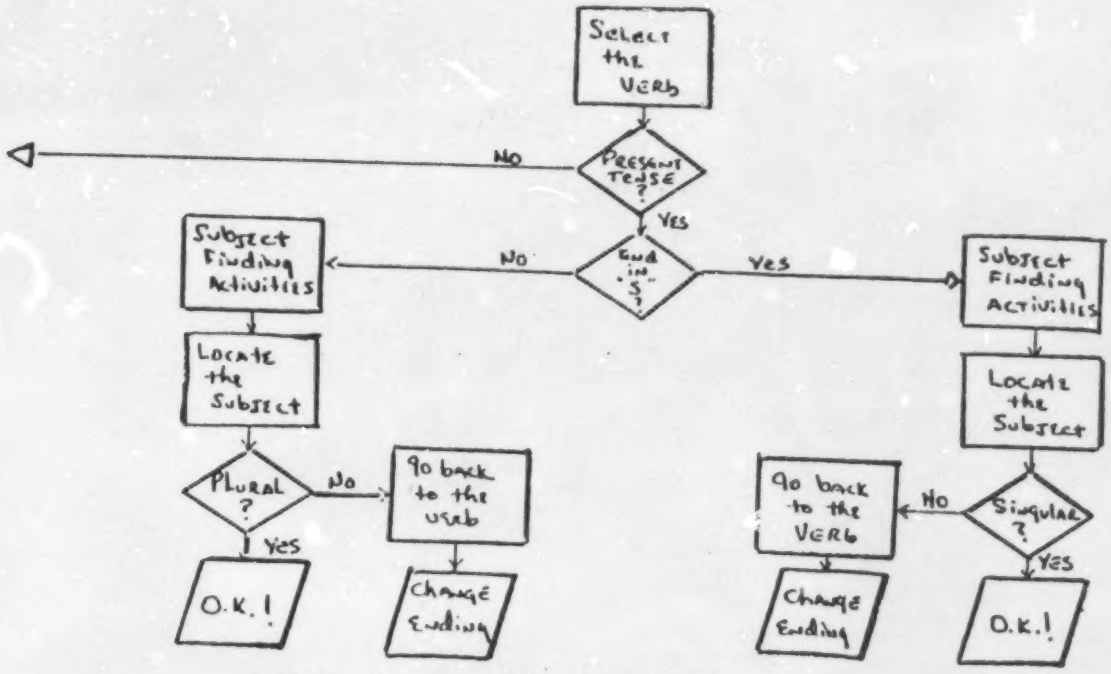
○ = Extroverts: Enjoy eye contact (smile) and dislike lack of eye contact (frown)

□ = Extroverts: Enjoy eye contact (smile) and dislike lack of eye contact (frown)

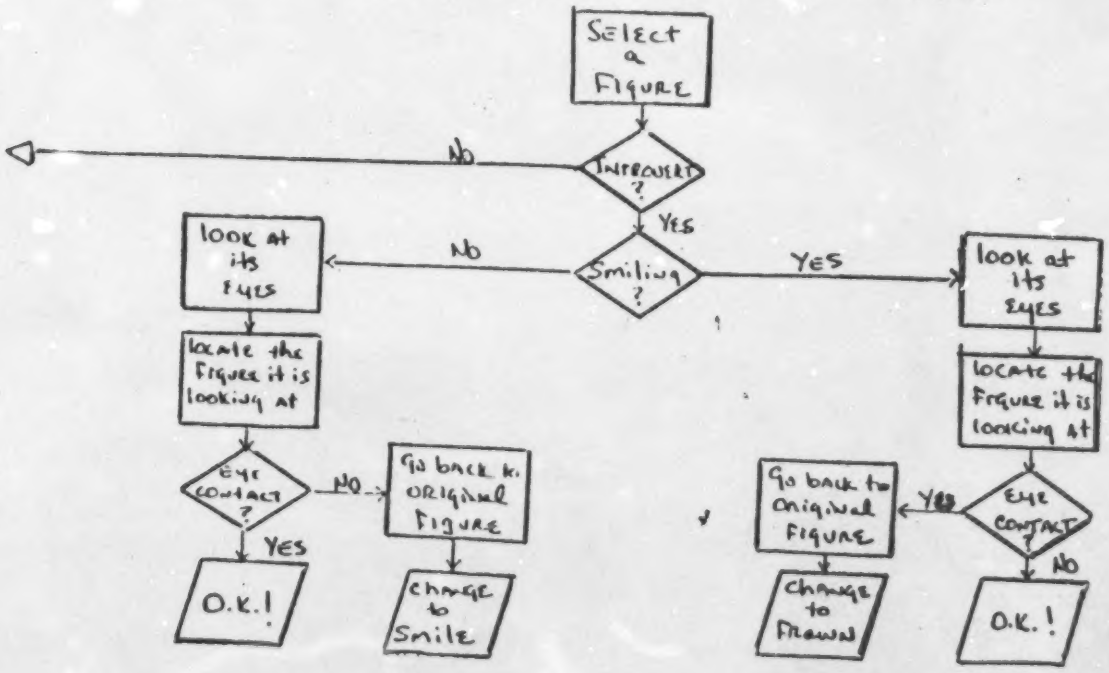
The most significant part of this activity was, as always, the student analysis section. Students had already engaged in discovering their own rules for subject-verb agreement yet many were still experiencing great difficulty in applying their rules in actuality. With the introduction of the above activity, we noticed, however, that these same students were much better able to apply their rule while editing their written responses to this particular exploration. Investigation into this phenomenon disclosed that the two activities, dealing with subject-verb agreement and solving the Introvert-Extrovert problem, shared several structural similarities. The most profound similarity was the "causal" relationship between the elements of each activity, i.e., the nature of the subject "causes" the verb to either end in "s" or not, while the nature of the eye contact "causes" the mouth to either smile or not. The similarities between these examples of "rule causality" is depicted on the following page.



Editing: Subject/Verb Agreement*



Editing: Normative Behavior--Introversion



The algorithmic analysis above shows the structural similarities between the two activities. Both exhibit

*with the obvious omission of the two exceptions "you" and "I".

The algorithmic analysis above shows the structural similarities between the two activities. Both exhibit elements of causal or, more properly, contingent relationship that seem to be the heart of our students' difficulty. Because students seem to be more able to solve the "extrovert" problem than to deal with similarly structured problems in language usage, it was felt that this activity would provide students an entree into the mysteries of subject-verb agreement.

Entree is, however, different from revelation. The question is, who should do the revealing in light of our students' obvious difficulties -- we or they? Because we, the curriculum-makers, have already uncovered the structural relationships, it may seem logical for us to design a lesson around our revealing algorithms. Most texts do just that. The fact is, of course, that there are any number of possible algorithms for these two processes and to select one as being "the" structure would be both psychologically and logically unsound. Even if we had stumbled upon "the" structure, we still would feel that it would be theoretically inexcusable for us to design activities that would deny students the chance to construct (or, rather, reconstruct) the structure for themselves. First of all, they will understand it better if they do. But, even more importantly, students should engage in this construction even if it were an end in itself. Rule making, rule verification, generating correct instances of a rule to begin with, and the cognitive skills employed in doing so, will be important to students long after they have internalized the vagaries of subject-verb agreement.

The Exploration

Activity I Students are instructed to list the classification activities that they have previously engaged in during the semester in reading and writing. Many instructors deal with this activity as a group discussion or have students work in small groups. Initially, students should try to reconstruct their classification activities. Later, they may scan through their actual work. Time constraints and personal style usually determine the way instructors deal with this question and questions like it, BUT they should not be handled superficially. These bridging questions deal with the underlying processes that run through the program and connect learning experiences with each other.

Activity II Students are given an unorganized list of sentences and are asked to group them into three categories of equal number and to name each category. Students' classification schemes can be as sophisticated as they can be far fetched and their hypothesis generating and testing against the givens is, in a sense, a lesson in itself. When students finally get around to testing "time" as a classification criterion (they have explored the essential nature of verbs in terms of time in a previous exploration), they notice that "past" and "present" divides the sentences cleanly but does not conform to the constraints of the problem -- three equal categories. However, "past", "present ending in 's'",

and "present not ending in 's'" does conform to the equal category constraint (we, of course, designed it that way).[1] This portion of the exploration combines students' understanding of the nature of verbs and problem solving through classification and hypothesis generating and testing. It also provides experience in sticking to a task to the end.

Activity III Students are informed that they are now going to see how good they are at creating rules or laws. They are presented several examples like the one below and are asked to come up with a rule that could account for the smiling and frowning behavior of the figures.[2] They are also required to explain in depth how they made their rule (what things did they look for, what did they try out, how did they know when they found the rule, etc.).

[1] A previous exploration dealt with the students' perception of the occurance and the functions of "s"-endings in English. The initial phase of this activity required students to record on a score sheet each time they heard a word that ended in "s" from a story that was read to them. The actual total is 44, yet students typically "hear" from as low as 12 to perhaps as high as 30. From this state of "disequilibrium", they explored potential causes for this discrepancy and established the importance of the "s" ending at least in terms of sheer frequency of use. Subject-verb agreement is not specifically explored at this time.

[2] When their eyes meet, the smile; when they do not, they frown.

This activity can be quite demanding for our students because it concerns processes that they may be only vaguely aware of and the reconstruction can be demanding. We believe that one reason that Cognitive Project students have demonstrated more sophistication in dealing with essay exams is that they are consistently communicating concepts (in this case, concepts meta-cognitive in nature) that are often difficult to express in writing.

Activity IV The students are told that they are now going to come up with a rule that explains what makes the "s" appear at the end of some present tense verbs and not at the end of others. Before they do however, they are instructed to solve a more complex "introvert-extrovert" problem involving two different "character-types" (see figure). They are strongly encouraged to think about how they are proceeding and how their strategies might be useful in helping them to determine their "s-rule".

The way that students encode and solve this problem will be of particular value to them in their subsequent subject/verb agreement work if they engage in it in light of this future activity. It appears that the notion of "Anticipatory Transfer" has a good deal to be said for it both empirically and from a common sense perspective. It makes sense that transfer of learning is enhanced when the "transfer" activity is connected to the "target" activity prior to engaging in either. The initial activity is, therefore, imbued with appropriate significance and power vis-a-vis the activity of primary interest, in this case, subject-verb agreement.

Two different personality types are depicted below. All 's act alike and all 's act alike. They follow two different rules of smiling behavior.

Figure out the rules that each personality type follows.

Smiling rule for △'s: (They smile when they are not making eye contact; frown when they do.)

Smiling rule for ○'s: (They smile when they make eye contact; frown when they do not.)

Again, students are asked to explain how they found their rule and how they knew that they were correct. Their actual responses to these questions are less important than the effort expended in reflecting upon the processes of generating and testing hypotheses in rule making and the cogency of the written communication upon this reflection.

Both parts of the question should be dealt with -- generating and verification are equally vital processes.[1]

Activity V At this point, students are given a representative list of present tense sentences and are asked to create a rule that explains what makes the "s" appear and disappear at the end of present tense verbs. We include the "I" and "you" exceptions but often instructors exclude the exceptions during the rule making phase. When their rule "fits" all instances, they are required to write it formally. Using traditional terms such as "1st person," "2nd person," "3rd person," and other half-remembered jargon that have conventional meaning only should be discouraged in favor of the students' own, more personally meaningful terms. Also, many students have notions such as, "singular subjects have singular verbs," which are, at best, trivial. At worst, they may be confusing and non-sensical. The idea of a verb being singular or plural isn't particularly fathomable to begin with and most of our students have associated "s" with pluralness, which would interfere with generating a valid rule--"plural" verbs do not end in "s".

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[1] Recent research and our experience verifies the hypothesis that the generating and the testing phases are two distinct processes, different in kind as well as difficulty. Many students who can deal effectively with the first phase find it very difficult to test their hypotheses on the sample sentences. Because these thinking capabilities are important for effective functioning in college and elsewhere, instructors should allow students to fully engage in this testing activity rather than pointing out how student generated rules do not fit the sample sentences. The thinking skills that students strengthen in this activity may be more important to them than the actual rule that they generate and verify.

It is always better that they forget previous notions of subject-verb agreement if, indeed, they have any. After they come up with their own rules, there is considerable "rule trading" whereby students adopt parts of other rules that they like or they may abondon their own rule entirely in favor of another. Instructors usually put the rule variations on the board or type them up for distribution to encourage such rule refining activities.

Activity VI Just as testing previously generated hypotheses is not merely a matter of rule-making in reverse,[1] this activity has two parts. The first engages students in finding instances of already given rules--we continue along the "introvert-extrovert" line, however, any number of other rule application activities could be substituted. The second involves preparing for actual student editing. Before students go back to edit previously written work, they are presented with a group of "introvert-extrovert" figures and are given the behavior-rules that each "type" follows. However, students are informed that several "impostors" may be present and it is their job to find them and prove that they are not "rule-followers". This activity isn't as easy as it sounds. We feel that it is important, however,

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[1] Our experience and recent research has demonstrated that successful rule generation often has little correlation with rule application. Rule making required students to engage in exploring the nature of language conventions, regularities, and occasional contradictions. These inductive, hypothesis generating processes are vital intellectual skills. Rule application, on the other hand, a cognitively demanding, deductive process that is uniformly overlooked in other programs. We believe that both the rule generating/inductive phase and the rule application/deductive phase are vital yet cognitively different processes that necessitate different treatments yet common compasis.

because it increases the liklihood of "anticipatory transfer' to subject-verb agreement editing -- there may be some "impostor" verbs hiding out in their writing as well.

Activity VII Students have previously explored memory and mnemonics, including when something should be memorized or understood conceptually. Subject-verb agreement is a conventional regularity that is essentially arbitrary in nature. This activity requires students to design their own mnemonic devices as aids for remembering their own rules. After this activity, if a student wishes to forsake his or her mnemonic for another's that is perfectly acceptable. However, each student should engage in the mnemonic-creating process -- their college professors are not likely to provide mnemonic aids for them later on.

Initial Findings

Entering students who were found on entry tests to be deficient in reading, writing, and math (i.e., reading, writing, and computing below approximately the 8th grade level) were randomly assigned at registration to Comparison and Experimental groups at the Basic Level and were taught by full-time faculty meeting in morning sessions. The Comparison Group was taught according to the objectives of the Academic Foundations Divisions reading, writing syllabi and by instructors with many years of experiences in teaching these courses. The Experimental group was taught by instructors with at least one semester of experience with the project using the materials and activities designed by the codirectors during the project's pilot year.

We feel that the data which follows is encouraging on several counts. While we expected to find significant differences in favor of the Experimental Group vis-a-vis the Comparisen Group on the Thorndike-Hagen Cognitive Abilities Test, we were surprised by the Experimental Group's performance on the standardized reading and holistically scored writing test and their pass-fail percentages based on these criteria. Because we emphasized cognitively-based, student centered activities that took considerable time away from drilling, practice, and traditional reinforcement exercises in the basic skills usually tapped by standardized tests (in fact we did none of it), we expected that the Experimental Group would achieve parity with the Comparison Group on these measures. We assumed that time we did devote to basic Skill exploration would make up in quality what it lost in quantity. We also tended to gear our instruction toward preparing for the more distant demands of college-level work which also took time away from basic "skill building". We were sure that the traditional skill building approaches aimed at standardized exit criteria would not be of lasting value, but we didn't expect to find such differences in favor of the Experimental Group on the standardized test themselves.

Another encouraging sign was the data for the Fall 1981 semester, which was gathered after the experimental design self-destructed due to our inability to maintain a Comparison Group - it simply became impossible to keep instructors out of the project. The mean scores achieved during the experimental semester (Spring 1981) were

actually improved upon, and with much larger Ns, after the comparison-group instructors joined the project. This suggests that it was not the nature of the instructor that lead to the significant between-group differences but the nature of the instruction.

Cognitive Abilities

Table 1 below displays post-test, adjusted means covaried for pre-test differences and F-scores denoting significances for the Thorndike-Hagen Cognitive Abilities Test.

Table 1

Variables (raw scores)	Adjusted, Post Test Means		
	Experimental	Comparison	f score
Verbal 1 - Vocabulary	7.54	4.12	11.1**
Verbal 2 - Sentence Completion	13.25	10.94	7.8**
Verbal 3 - Verbal Classification	7.55	5.21	4.1*
Verbal 4 - Verbal Analogies	13.50	9.42	7.3**
Verbal Total	42.15	27.36	18.0***
Quant. 1 - Relationships	12.12	9.24	6.1**
Quant. 2 - Number Seriation	9.79	7.71	5.7*
Quant. 3 - Equation Building	7.84	7.89	0.4
Quantitative Total	29.52	25.31	4.3*
Non Verbal 1 - Figure Classification	11.37	10.99	0.1
Non Verbal 2 - Figure Analysis	13.57	11.03	4.5*
Non Verbal 3 - Figure Synthesis	18.90	16.90	2.3*
Non Verbal Total	42.65	39.67	1.5

* Significant at .05 level
** Significant at .01 level
*** Significant at .001 level

The Experimental Group's adjusted post-test means were significantly different from the Comparison Group's post-test means on the Verbal Battery total at the .001 level of significance and the Quantitative Battery total at the .05 level of significance. These batteries, according to the test manual, measure analytic reasoning skills, levels of abstract reasoning, short-term and long-term memory for verbal and quantitative concepts and, in problem solving, resistance to distraction. The post-test differences on the Non-Verbal Battery were not significant. The relationship between the Verbal and Quantitative scores and the Non-Verbal score is an important one. Students who score higher on the Non-Verbal Battery than on the Verbal and Quantitative Batteries may have relatively well developed reasoning abilities but they process imformation quite differently from the high-verbal student. These students are effective in perceiving and manipulating spatial relationships and tend to organize and handle data in complex wholes and patterns.[1] Because of the verbal, analytic, and abstract nature of much of college-level work, we were concerned about the fact that both Experimental and Comparison Groups scored either equal to or higher on the Non-Verbal Battery than on the Verbal and Quantitative Battery on the pre-test. The post-test means show that while the Comparison Group continued to maintain this troublesome non-verbal superiority (it actually increased), the Experimental Group made progress in improving the verbal reasoning/non-verbal reasoning balance - verbal reasoning began to take primacy as both

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[1] Cognitive Abilities Test, Examiners Manual, Houghton Mifflin, 1978, p. 51.

improved over the semester.

Reading

Pre-test, post-test, and adjusted post-test means on the Reading Battery of the Test of Adult Basic Education for the Experimental and Comparison Groups are shown in Table 2 below. The vocabulary and comprehension adjusted post-test means for the Experimental and Comparison Group were significantly different at the .05 and .001 levels respectively. Total post-test score means were also significantly different in favor of the Experimental Group at the .001 level.

Table 2

Test of Adult Basic Education -- Reading

RAW SCORES

Variables	EXPERIMENTAL	COMPARISON	f scores[3]
Vocabulary:			
Pre-test Means	19.89 (7.4)[2]	14.08 (6.3)	
Post-test Means	27.00 (8.2)	19.53 (6.4)	
Adjusted Post-test Means[1]	24.60	21.93	6.13*
Comprehension:			
Pre-test Means	22.96 (7.0)	20.69 (6.5)	
Post-test Means	25.19 (8.1)	18.74 (6.2)	
Adjusted Post-test Means	24.74	19.18	25.14***
Total:			
Pre-test Means	42.85 (7.2)	34.85 (6.4)	
Post-test Means	52.75 (8.1)	38.00 (6.3)	
Adjusted Post-test Means	50.26	40.49	21.00***

[1] Covaried for pre-test means.

[2] Grade equivalents are shown in parentheses.

[3] * significant at .05 level
** significant at .01 level
*** significant at .001 level

Time on Task -- Quantity or Quality?

What this indicates is open to interpretation but, to the extent that this result is explained by differences in educational approach, it suggests that quality of time spent on basic skill tasks may be more important than the amount of time spent on such tasks. Sigmond Tobias of City College, City University of New York, explains in a recnt article that the hypothesis that any instructional mode that induces students to spend more "time on task" than a comparison mode would result in higher achievement is "only partially correct and that what counts is how the student uses that time and what the student is thinking while studying the materials."[1] Also implied by these results is that direct instruction aimed toward exit criteria on standardized tests is not always particularly helpful, even if it were a good idea. We are not saying that standardized tests are invalid exit criteria for remedial programs. The point is that it is not necessary to devote the entire remedial effort toward achieving them, particularly when so much more will be demanded of our students when they leave these programs.

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[1] "When Do Instructional Methods Make a Difference?" The Educational Researcher, April, 1982, pg. 5.

Writing

The area of most dramatic improvement for the Experimental Group was writing. Table 4 shows the results of holistically scored pre and post semester essays. Each essay was scored by two readers; a combined score of 5 being the criterion for progress to the next level. Essays were numbered and mixed so that readers were unaware of student name or group.

Table 4

Holistically Scored Essay Data

(combined score - two readers)

Spring 1981 Cohort	Experimental (n=22)	Comparison (n=19)
Pre-test Mean	4.0	4.3
Post-test Mean	5.9	4.8
Fall 1981 Cohort	**Experimental (n=82)**	
Pre-test Mean	3.6	-
Post-test Mean	6.0	-

Again, the Experimental Group did no grammar drilling or practice and, in fact, wrote few actual essays that could be seen as being even remotely in preparation for the exit essay. The writing that project students did engage in was typically related to the intellectual explorations and usually entailed written explanations of how they solved problems, how they came to particular conclusions, or what they were experiencing internally, i.e., internally reflecting upon the nature of their thinking or reasoning processes in

particular situations and communicating this reflection in writing. Project students also engaged in considerable constructing, in writing, of relationships between explorations, mental processes, the basic skills, and academic matters in general.

The aspects of technical importance of a grammatical nature that were examined by project students (namely: the nature of verbs, the nature of the sentence, and subject/verb agreement) were explored in ways to allow students (1) to generate and test hypotheses regarding standard English usage, (2) to experience "disequilibrium" when their old notions do not match reality, (3) to classify grammatical categories according to student-determined criteria, and (4) to analyze processes rather than only grammatical products to be memorized, e.g., the arbitrary yet lawful nature of grammatical rules contingent relationships in "grammatical rule-causality",[1] and applications of self-generated or given rules.[2]

It is interesting to note that when the experimental design became inoperative as the project expanded for the 1981-1982 academic year, the holistically graded writing scores show even greater progress pre to post-test than the Experimental Group achieved during the previous semester. These findings were achieved with new instructors and with much larger N's. This pattern can also be

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[1] For example, as was demonstrated in the student exploration section, the endings of present tense verbs are contingent upon ("caused" by) the number of the subject.

[2] Our experience indicates that even when a student constructs a rule, it does not guarantee that the rule will, or even can, be applied by the same student. We speculate that an operation central to Piagetian theory - operational reversibility - may not be completely integrated into many of our students' cognitive functioning, particularly in situations of an abstract, formal nature, i.e., editing (rule verifying) is not a simple matter of reversing the process of rule making, or more precisely, such reversibility is not a simple matter.

seen in Table 5 which shows pass-fail/repeat data based upon the departmental exit criteria for writing, reading, and math for both groups.

Table 5

PASS- FAIL DATA

SPRING 1981 COHORT

VARIABLE	EXPERIMENTAL GROUP			COMPARISON GROUP		
Subject:	N	PASS	REPEAT-FAIL	N	PASS	REPEAT-FAIL
READING	32	19 (59%)	13 (41%)	31	10 (32%)	21 (68%)
WRITING	32	16 (50%)	16 (50%)	31	8 (36%)	23 (74%)
MATH	32	17 (55%)	15 (45%)	31	10 (32%)	21 (68%)

FALL 1981 COHORT

VARIABLE	EXPERIMENTAL GROUP			COMPARISON GROUP		
Subject:	N	PASS	REPEAT-FAIL	N	PASS	REPEAT-FAIL
READING	99	62 (63%)	37 (37%)	-	-	-
WRITING	84	59 (70%)	25 (30%)	-	-	-
MATH	77	49 (64%)	28 (36%)	-	-	-

Longitudinal Findings

The Project's primary goal is to achieve results at the college level and it is there that the success or failure of the approach must be assessed. Because the project is relatively young and because the instructional materials and activities are operative at the basic level only at this stage[1], we have only fragmentary findings.[2]

We do know that Cognitive Project students are at Passaic County College in greater numbers after three semesters than are Comparison Group students -- Experimental Group N=50, Comparison Group N=30 (each group began with Ns of approximately 150).[3] More importantly, we know that the Cognitive Project delivers more students into the college-level programs and with fewer detours and repeated courses along the way. Of the fifty Experimental Group students from the initial cohorts, 90% were enrolled in college-level programs in their third semester compared to 65% for the Comparison Group. Three semesters is optimal for a basic-level student to reach full college-level work. Further longitudinal research to assess how well these students are doing in their college programs is under way.

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[1] We are presently in the process of developing curricula at higher remedial levels and are exploring integrating introductory college level courses into the project.

[2] Initial longitudinal findings are based upon three cohorts (Fall, 1979, Spring 1980, and Fall 1980) that enrolled and were placed at the basic, remedial-level at Passaic County College during the project's pilot year and the first semester of the expanded Title III Project.

[3] We have, unfortunately, no data on students transferring to other institutions.

Conclusion

What's So Basic About The Basic Skills?

It may sound boastful to propose that our approach can accomplish twice as much as many other programs can only partially accomplish, but our humility lies in our theoretical foundations. We feel that the reason that other approached so often fail, while devoting full time to the one-half that they do attempt (i.e., the basic skills), is that they are making things twice as hard for their students. The basic skills are difficult to approach from the angle that they usually choose. The basic skills cannot be bullied into existence through practice alone. Unless the intellectual foundations are nurtured, practice can only be partially effective.

It is important to note that a person may be a concrete operational thinker in many realms of activity yet formally operational in others. In large part, Passaic County College students come from backgrounds rich in interaction, adversity, and complexity. They have already overcome many emotionally and intellectually trying situations that have demanded survival strategies of enormous mental adaptiveness. These students are typically unable to transfer how smart they really are away from the academic environment to academic work. It is easy for educators to allow academic deficiencies to obscure cognitive efficiencies. It is clear that a carefully designed curriculum beginning at the level and in the areas where our students are "smart" can make a significant difference in terms of academic success provided that the structure of this integrated curriculum

makes use of every opportunity to enhance this transfer. When how smart they are in one area does indeed transfer to other areas of cognitive life, they make rapid progress in the basic skills and content-area subjects, think more positively about themselves, and can handle the intellectual demands of college life.

The fact is that basic skills are not basic at all. Nothing is basic for an individual who doesn't possess the competency to begin with. What we consider basic is at the upper reaches of our students' working intellects. Piaget often speaks of a sort of cognitive amnesia, a universal phenomenon whereby human beings are completely insensitive to previous structures of knowledge once they have moved on to higher levels of intellect. It seems to be a quality of human nature to consider all that we personally know and are familiar with to be "basic" knowledge. All of us, remedial student and professor alike, need to understand the nature of what we are in the process of learning. We believe that those who approach learning through understanding can acquire not only content but can gain ways of viewing knowledge and the world that will never leave them.